

## A NEW SUBSPECIES AND A REVISED STATUS IN *THERETRA* HÜBNER (LEPIDOPTERA: SPHINGIDAE) FROM VANUATU AND NEW CALEDONIA

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### Abstract

*Theretra insularis ambrymensis* subsp. n. is described and illustrated from Vanuatu. *Theretra lifuensis* Rothschild, 1894, stat. rev. is returned to specific rank from synonymy with *Theretra clocho celata* (Butler, 1877).

### Introduction

Three species of *Theretra* Hübner have been recorded from Vanuatu. *T. clocho celata* (Butler) is found from northeastern Australia and throughout New Guinea to Vanuatu and Lifu (= Lifou) in the Loyalty Islands, New Caledonia. *T. silhetensis intersecta* (Butler) is recorded from Sulawesi, the Moluccas, New Guinea and Australia eastwards to the Solomon Islands, Vanuatu, New Caledonia, Fiji and Samoa (D'Abraera 1987, Robinson 1975, Schmit 2002). *T. nessus* (Drury) is recorded from the Solomon Islands, New Caledonia and Vanuatu (Schmit 2002). A fourth species, *T. aquila* Lachlan & Moulds, was described from the northern island of Espiritu Santo in Vanuatu but subsequently synonymized by Kitching and Cadiou (2000) as a melanic form of *T. s. intersecta*.

In December 1988 and January and September 1989, a series of eight males and twelve females of a species similar to *T. insularis lenis* Jordan from the Solomon Islands (Tennent 1999), was collected from Ambrym, a northeastern island of Vanuatu. Further assessment of these specimens has indicated clear differences from the above subspecies in several characters, including markings, colour tones and genitalia and they were found to represent an undescribed subspecies of *T. insularis* (Swinhoe).

*T. lifuensis* from Lifou Island, New Caledonia, was described as a distinct species by Rothschild (1894) but synonymized by Rothschild and Jordan (1903). The recent collection and evaluation of ten males and two females from Lifou (= Lifu) indicates they are a distinct species and should be removed from synonymy with *T. clocho celata*.

### *Theretra insularis ambrymensis* subsp. n.

(Figs 1-3, 7)

*Types.* Holotype ♂, VANUATU: Olal Catholic Mission area, north Ambrym Is., 19.ix.1989, R.B. Lachlan (in Australian National Insect Collection [ANIC], CSIRO, Canberra). Paratypes: 7 ♂♂, 10 ♀♀, Olal Catholic Mission area, north Ambrym Is., 25.xii.1988, 9,12.i.1989 & 19-22,24,28.ix.1989, R.B. Lachlan; 2 ♀♀, Sesivi Catholic Mission, south-west Ambrym Is., 29.ix.1989, R.B. Lachlan (in ANIC, The Natural History Museum, London, Australian Museum, Sydney and RBL collection).

**Description.** Male (Figs 1-2). Forewing length 41-45.7 mm ( $n = 8$ ). Antenna pink above, brown below; dorsal surface of head light olive green; small dark median spot on prothorax. Thorax light olive green with four light orange brown stripes, the median pair curving laterally at posterior end of thorax; thin lateral creamy-brown stripe from above palpi, along base of antenna to posterior of thorax; thorax ventrally creamy-brown, tending light orange brown laterally. Abdomen above uniform light olive brown suffused with paler scales; faint olive lateral basal patch on most specimens, absent in some, dark olive scales scattered unevenly; abdomen below pale like thorax but more heavily suffused with black scales. Fore tibia covered in creamy pink hair scales; outer edges of fore tarsi, mid and hind tibiae and tarsi distinctly white.

Forewing upperside as in Fig. 1; termen only slightly convex, ground colour yellowish-green with olive transverse oblique line from apex to near centre of inner margin, this line slightly disjointed at vein  $R_5$  in most specimens; three more parallel but not so distinct olive transverse oblique lines generally from around vein  $1A+2A$  to vein  $R_5$ , basad of distinct line; inner pair are obsolescent and close together; small, nearly straight faint olive subbasal line from inner margin to costa, bending basally near costa; basal region slightly darker yellowish-green; subtornal and subterminal areas distad of distinct olive oblique line darker, tending lighter in tornal and terminal areas, these areas all lightly speckled with dark olive scales; small, faint dark olive discal spot in some specimens, absent in most. Forewing underside as in Fig. 2; ground colour light orange brown from base to irregular faint, dark olive subterminal line visible from apex to tornus; darker distad of this line; few markings basad, remainder speckled with black scales and small olive blotches.

Hindwing upperside as in Fig. 1; costal region cream; basal one third of wing, black with lighter streaks along veins; faint yellowish-green terminal band speckled with dark olive scales from apex to tornus, at least 4 mm wide at apex tending darker, and narrow at tornus; inner edge of this band appears straight. Hindwing underside as in Fig. 2; similar to forewing but slightly more blotched and speckled except for space  $1A$  being plain creamy-brown.

Male genitalia (Fig. 7). Uncus in lateral view not long, dorsal and ventral surfaces gently curved, narrower at distal end with short downward directed hairs on ventral surface, heavy covering of backward directed hairs on lateral and dorsal surface; gnathos in lateral view short, thick, slightly upturned distally, black and serrate on dorsal surface of apex, evenly curved on ventral surface to apex; aedeagus in lateral view largely cylindrical, slightly enlarged distally, distal margin of apex rounded from dorsal surface then slanted basally towards ventral surface, small, narrow elongated row of black barbs in cleft on right lateral side near apex; valva twice as long as wide, almost parallel sided, ventral surface slightly concave, dorsal surface straightish,

distally rounded; sacculus process short, rectangular, dorsal and distal edges usually with some very small serrations, ventral margin of sacculus clearly convex.

Female (Fig. 3). Forewing length 47.5-52 mm ( $n = 12$ ). Forewing termen more convex than in males, particularly evident between veins  $R_5$  and  $M_3$ . Upperside and underside similar to males in colouration and within the same range of variability. Forewing discal spot usually not present.

Female genitalia. Apophyses posteriores long, very slender, cylindrical, very minutely enlarged subapically; apophyses anteriores half the length of apophyses posteriores, cylindrical, slender; signum long, narrow, extending from middle to base of corpus bursae, consisting of a pair of closely parallel lines of cornuti, appearing as small flattened spikes, set in rows of three or four, closely packed together.

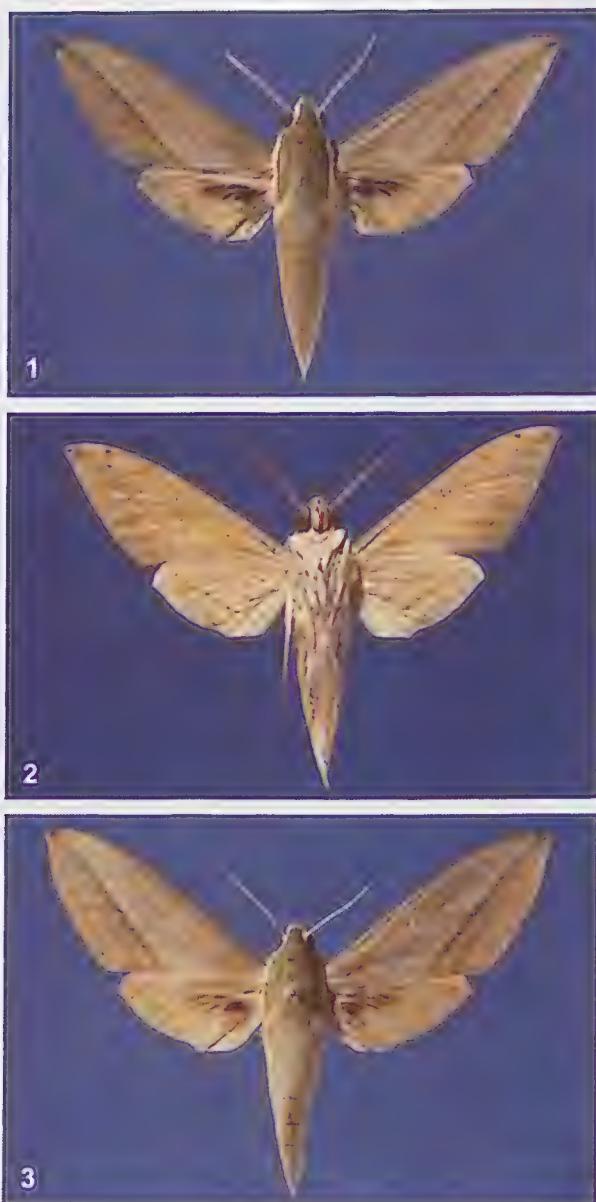
**Etymology.** The subspecific name *ambrymensis* is derived from the island in Vanuatu where the specimens were collected.

**Distribution.** A single specimen collected on Tongoa Island in August, 1934 is in The Natural History Museum, London (Ian Kitching, pers. comm.). All other known specimens were collected in December 1988, January 1989 and September 1989 on the island of Ambrym, Vanuatu. The two islands are about 65 km apart.

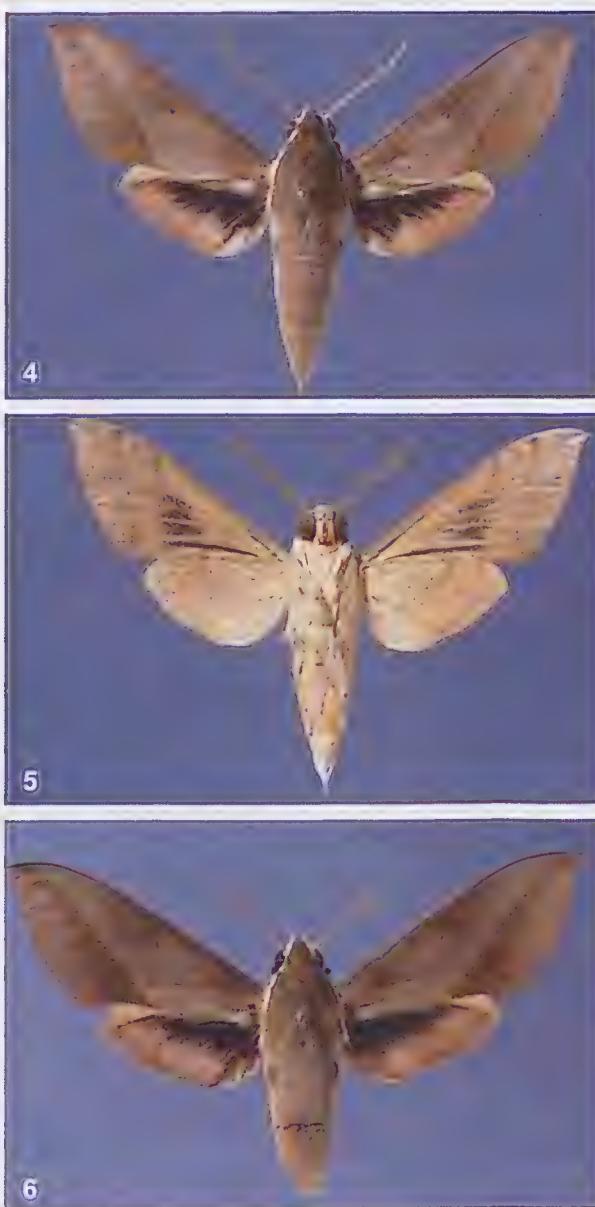
## Discussion

*Theretra insularis ambrymensis* is similar to *T. insularis lenis*, the subspecies occurring in the Solomon Islands, which Tennent (1999) recorded as far east as San Cristobal but not from the far eastern Santa Cruz islands north of Vanuatu, despite recording seven other species of sphingids from these islands. There is a distance of over 800 km between these two subspecies.

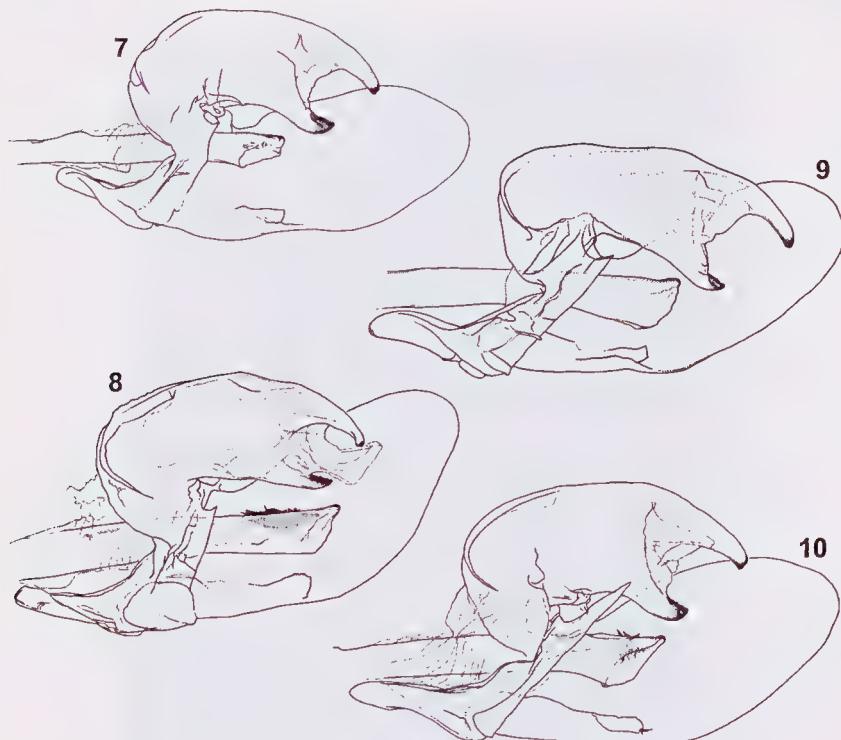
Both sexes of *T. i. ambrymensis* are distinctly larger than in the other four subspecies of *T. insularis*, particularly in *T. i. lenis* which is the smallest but also the closest geographically to *T. i. ambrymensis*. Forewing lengths of male *T. i. ambrymensis* range from 41-45.7 mm ( $n = 8$ ); forewing lengths of male *T. i. lenis* range from 37-39 mm ( $n = 12$ ). The forewing discal spot is missing, or barely discernible in the majority of *T. i. ambrymensis* specimens but is very prominent in the western populations of *T. insularis*, although in *T. i. lenis* it varies between prominent to barely visible but is usually present. The four oblique lines on the forewing of all subspecies of *T. insularis* are more prominent in the western populations but in *T. i. ambrymensis* the inner pair are clearly obsolescent by comparison. Also, the wings of *T. i. ambrymensis* have a distinct yellowish-green appearance; they are darker in *T. i. lenis*. The small subbasal line and slightly darker basal area of the forewing on *T. i. ambrymensis* is almost identical to that seen on *T. cloho celata* but is not present on any of the *T. insularis* subspecies examined.



Figs 1-3. *Theretra insularis ambrymensis*. (1-2) holotype male: (1) upperside; (2) underside. (3) paratype female, upperside.



Figs 4-6. *Theretra lifuensis*. (4-5) male: (4) upperside; (5) underside. (6) female, upperside.



**Figs 7-10.** Male genitalia of *Theretra* spp. All genitalia *in situ* but with left valva removed, lateral view. (7) *T. insularis ambrymensis* paratype, Ambrym I., Vanuatu; (8) *T. insularis insularis*, Tabubil, Papua New Guinea; (9) *T. lifuensis*, Lifou I., Loyalty Islands, New Caledonia; (10) *T. cloTho celata*, Lizard I., Queensland.

On the hindwing of *T. i. ambrymensis* the black is restricted to the basal area only. This black region is more expansive on all other subspecies, particularly the western populations such as *T. i. insularis*, where the hindwing is almost completely black. The faint yellowish-green speckled terminal band running from the apex to the tornus has a nearly straight inner edge. This is not seen in the other *T. insularis* subspecies, although *T. i. lenis* shows some affinity in this character. The lateral basal abdominal patch is barely visible or absent in *T. i. ambrymensis*, whereas it tends to be generally more obvious in *T. i. lenis* and certainly in the western subspecies *T. i. insularis*.

As no specimens of *T. i. lenis* were available for dissection, several males of *T. i. insularis* (Fig. 8) from Papua New Guinea were dissected and their genitalia compared with those of *T. i. ambrymensis*. A number of differences were noted. In lateral view, the valva of *T. i. ambrymensis* is ovate with a

straight dorsal margin. In *T. i. insularis* the dorsal and ventral margins are clearly angled upwards, the distal margin is more pointed and the central section of the dorsal margin is convex. Also, the sacculus ventral margin is clearly convex in *T. i. ambrymensis* but almost straight in *T. i. insularis*. The uncus and gnathos, in lateral view, are thicker and the ventral margin of the gnathos is more indented in *T. i. ambrymensis*. The narrow cleft of spines on the right lateral side of the aedeagus is much shorter than that seen in *T. i. insularis*.

It appears that any records of *T. cloTho celata* from Vanuatu have been misidentifications of *T. i. ambrymensis*.

***Theretra lifuensis* Rothschild, 1894, stat. rev.**

(Figs 4-6, 9)

*Theretra lifuensis* was first described as a distinct species by Rothschild (1894) from an unstated number of specimens collected on Lifu (= Lifou) Island, Loyalty Islands, New Caledonia. It was later synonymised by Rothschild and Jordan (1903) with *Theretra cloTho celata* without comment (Ian Kitching, pers. comm.). Reassessment of ten males and two females collected on Lifou Island in December 2003 clearly show that this species should be removed from synonymy with *T. cloTho celata* and reinstated as a distinct species. A specimen illustrated by Schmit (2002), taken on the main island (Grande Terre) of New Caledonia, approximates the specimens taken on Lifou in December 2003, except that the black basal area on the hindwing upperside is more expansive. This is probably due to the isolation of the different populations, so it may be assumed that it is also *T. lifuensis* and not *T. cloTho celata* as indicated in the paper of Schmit (2002). Therefore, *T. cloTho celata* has yet to be recorded from New Caledonia.

*T. lifuensis* is a smaller species than *T. cloTho celata* with forewing lengths ranging from 33.8-37.3 mm ( $n = 9$ ) in males and 40.1 mm in females. In *T. cloTho celata*, forewing lengths range from 35-42 mm ( $n = 34$ ) in males and 41.5-48.9 mm ( $n = 25$ ) in females. The forewing of both sexes of *T. lifuensis* is less elongated than in *T. cloTho celata*, the termen is more convex between veins  $M_1$  and  $M_3$  and has the stigma clearly evident in all specimens examined, unlike *T. cloTho celata*. There is an obvious, distally scalloped olive band adjacent to and distad of the dark olive transverse oblique line in *T. lifuensis*, only vaguely seen in some specimens of *T. cloTho celata*. On the hindwing of *T. lifuensis* there is a wide pinkish-brown terminal band, more pinkish in females. In *T. cloTho celata* this band is yellow-brown. On the abdomen of *T. lifuensis* the single black basal lateral spot on each side is generally very prominent when compared in series to *T. cloTho celata*.

The male genitalia of *T. lifuensis* (Fig. 9) differ from those of *T. cloTho celata* (Fig. 10) in lateral view, having an ovate valva with the distal margin rounded. This margin is more pointed and the valva more elongate in *T.*

*clotho celata*. The sacculus is wider and the sacculus process is blade-like with slightly irregular dorsal and distal margins in *T. clotho celata*. In *T. lifuensis* the sacculus process is smaller with a distinctive three-pointed distal apex. In lateral view, the uncus of *T. lifuensis* is the same shape but narrower with a clear convex bulge on the dorsal margin immediately behind the uncus. Half way along the uncus, in dorsal view, the lateral margins are concave; in *T. clotho celata* they are straight, leading to the apex of the uncus. In lateral view the gnathos of *T. lifuensis* is narrower and its posterior ventral surface is less concave than seen in *T. clotho celata*.

When viewed in series, the differences between *T. lifuensis* and *T. clotho celata* are very clear.

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